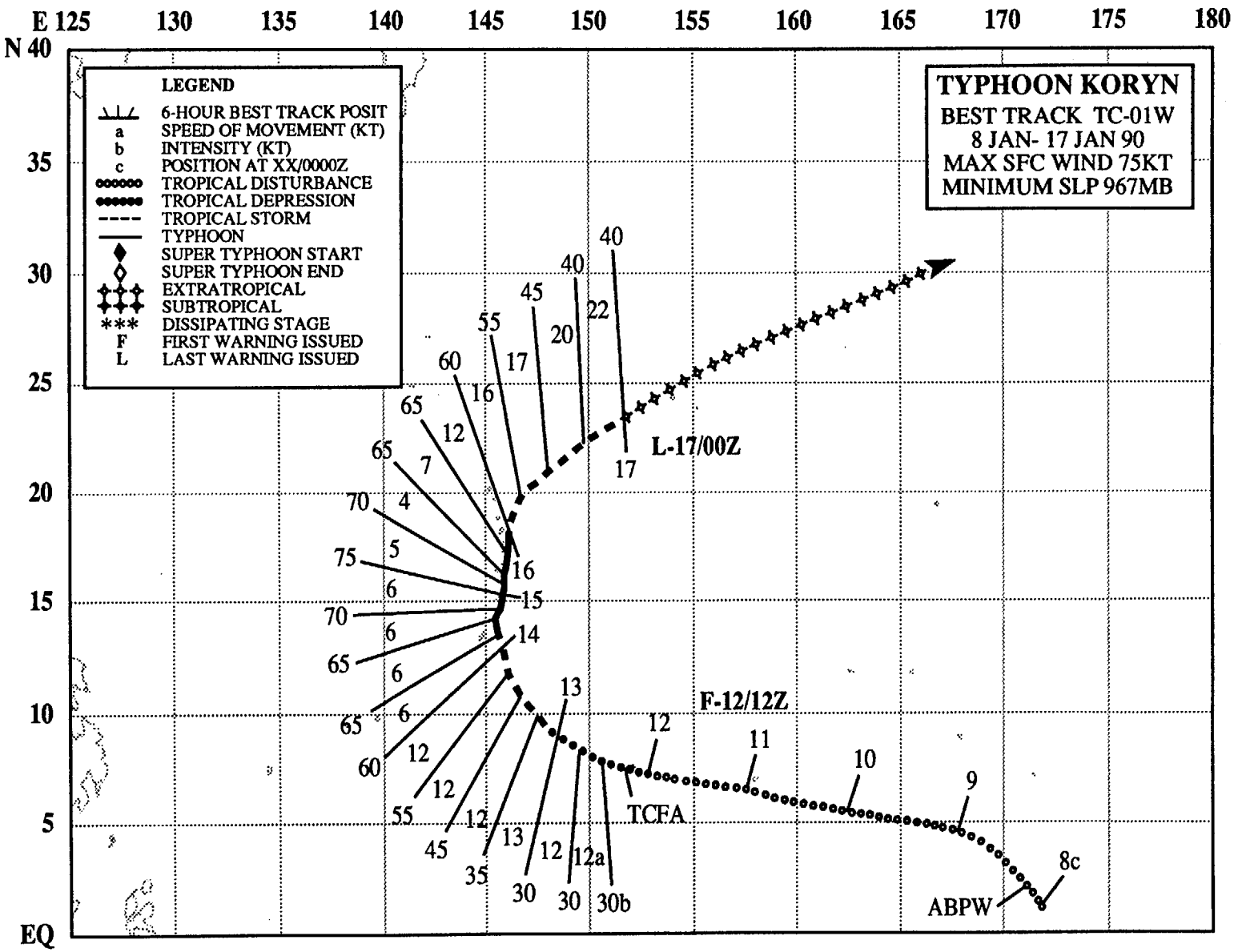
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EQ
LEGEND
6-HOUR BEST TRACK POSIT
a SPEED OF MOVEMENT (KT)
b INTENSITY (KT)
c POSITION AT XX/0000Z
TROPICAL DISTURBANCE
TROPICAL DEPRESSION
TROPICAL STORM
TYPHOON
SUPER TYPHOON START
SUPER TYPHOON END
EXTRATROPICAL
SUBTROPICAL
*** DISSIPATING STAGE
F FIRST WARNING ISSUED
L LAST WARNING ISSUED
TYPHOON KORYN
BEST TRACK TC-01W
8 JAN- 17 JAN 90
MAX SFC WIND 75KT
MINIMUM SLP 967MB
L-17/00Z
F-12/12Z
TCFA
ABPW
8c
30b
12a

TYPHOON KORYN (01W)

I. HIGHLIGHTS

Koryn, the first tropical cyclone of 1990 in the western North Pacific, became the third typhoon to occur in January in the past eleven years. It developed at an unusually low latitude. Unlike Typhoon Jack (1989), which two weeks earlier came to an abrupt halt and rapidly dissipated just east of Guam, this typhoon turned northward and tracked through the Mariana Islands. Koryn brought the strongest sustained winds to the Marianas since Roy (1988), another January typhoon.

II. CHRONOLOGY OF EVENTS

081500Z - First mentioned on the Significant Tropical Weather Advisory due to persistence of convection.

120430Z - Tropical Cyclone Formation Alert followed 4 mb pressure falls with strong easterly flow to the north, weak westerlies to the south and a CI 1.5.

121200Z - First warning based on increased convective curvature and outflow aloft.

130600Z - Upgraded to tropical storm intensity following improved organization of convection and good outflow aloft in all quadrants which resulted in a CI 2.5.

140600Z - Upgraded to typhoon based on the appearance of an eye and a CI 4.0.

150000Z - Peak intensity 75 kt (39 m/sec) with a ragged eye and a CI 4.5.

160000Z - Downgraded to tropical storm with signs of extratropical transition, shearing-type cloud pattern and restricted outflow.

170000Z - Final warning. Koryn extratropical with exposed low-level circulation center displaced to southwest of central cloud mass.

III. TRACK AND MOTION

Koryn originated as a disturbance (Figure 3-01-1) near the Gilbert Islands. The cyclonic circulation formed in sympathetic response to enhanced westerly monsoonal flow extending from the Solomon Islands eastward along 5° south latitude to a low pressure system near the Fiji Islands. While Koryn was embedded in the flow south of the subtropical ridge, it moved west-northwestward to Chuuk (Truk) in the eastern Caroline Islands. The subtropical ridge was north of the tropical cyclone along 20°

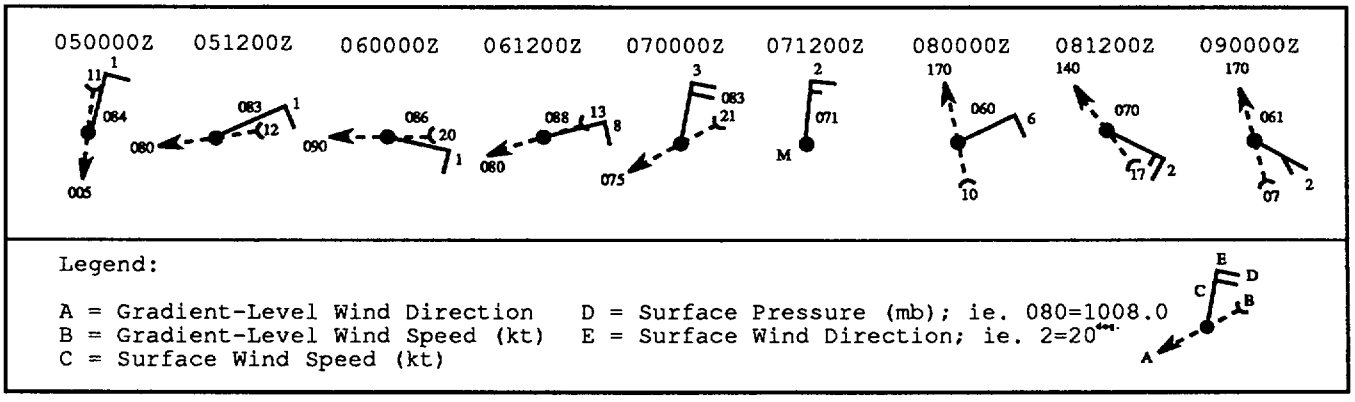


Figure 3-01-1. Surface pressure, gradient and surface wind reports for Tarawa (WMO 91610) in the Gilbert Islands reflect the formation of Koryn just to the west of the station. From 050000Z until 071200Z, the gradient-level wind is the normal cross-equatorial flow from the Northern Hemisphere, around a buffer system on the equator to the monsoon westerlies farther south. Note that on 8 January, the pressure in the past 24 hours fell over 2 mb and the gradient-level flow abruptly shifted to south-southeasterly. This supports the formation of a cyclonic circulation just to the west of the station.

north latitude; but lower pressures aloft in the northern Marianas indicated a break in the ridge. Koryn turned to a more northward track toward this break in the ridge and Guam. The typhoon slowed, passed just east of Guam and directly over Saipan. The slow forward motion and prolonged northward track appear related to the weaker steering flow associated with the break in the ridge and with the relative broad character of the ridge itself (Figure 3-01-2). Strong zonal westerlies aloft resulted in recurvature and a northeastward acceleration. Koryn's residual circulation and associated cloudiness continued northeastward along the edge of the maritime polar air and linked up to a passing short wave.

IV. INTENSITY

Koryn's weak low-level circulation first appeared just to the north of a broad area of cloudiness that stretched along and south of the equator. As this circulation moved west-northwestward, convection flared-up to its north and east. This enhanced cloudiness (Figure 3-01-3) became more organized and developed into a tropical cyclone as the low-level circulation center moved beneath an area of upper-level divergence. The synoptic scale upper-level anticyclone remained displaced to the east. Although upper tropospheric southeasterlies restricted Koryn's outflow to the southeast, the upper-level anticyclone of the typhoon continued to provide good outflow until the system reached its peak intensity (Figure 3-01-4). As Koryn moved northward, increasing vertical wind shear in the mid-

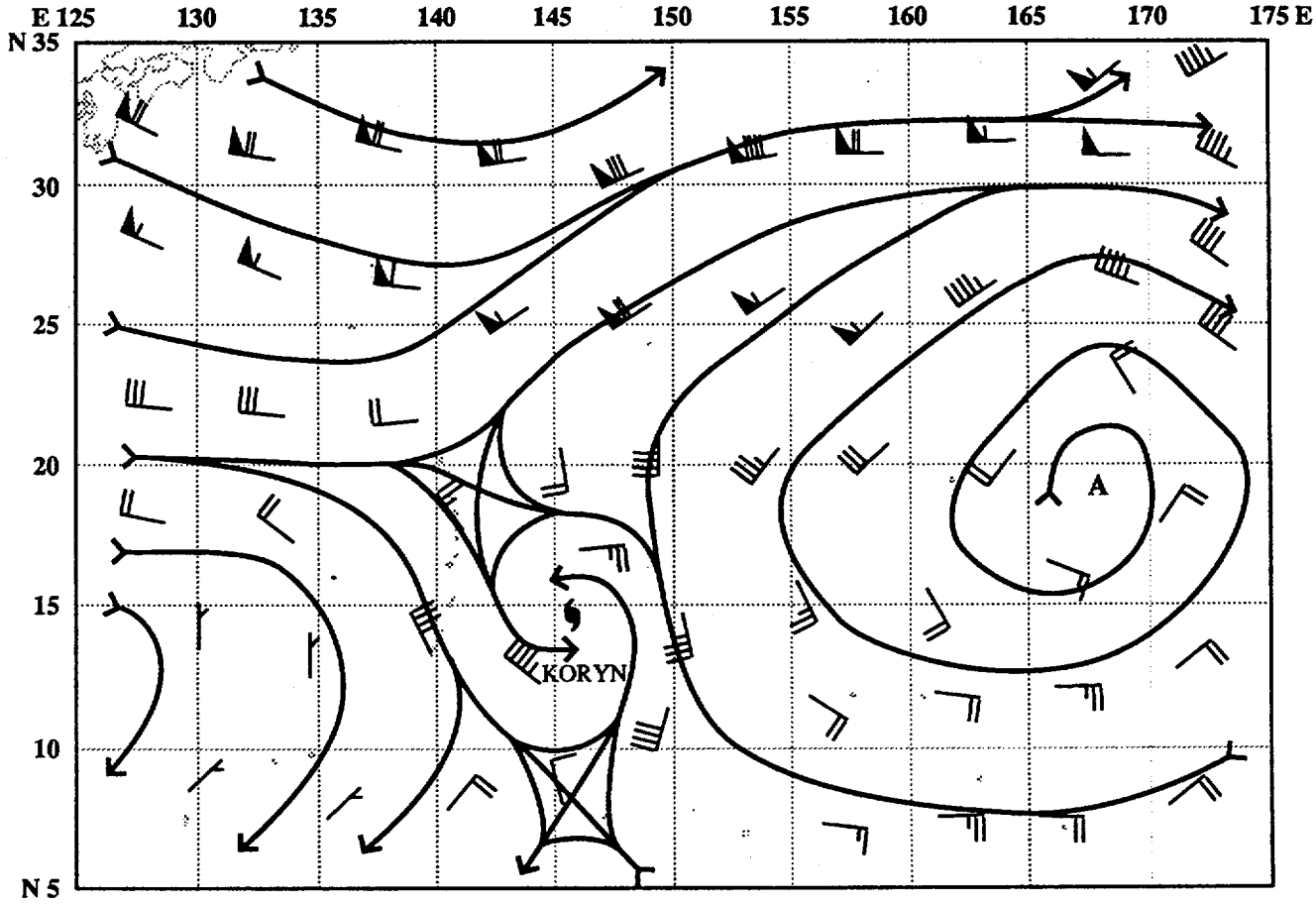
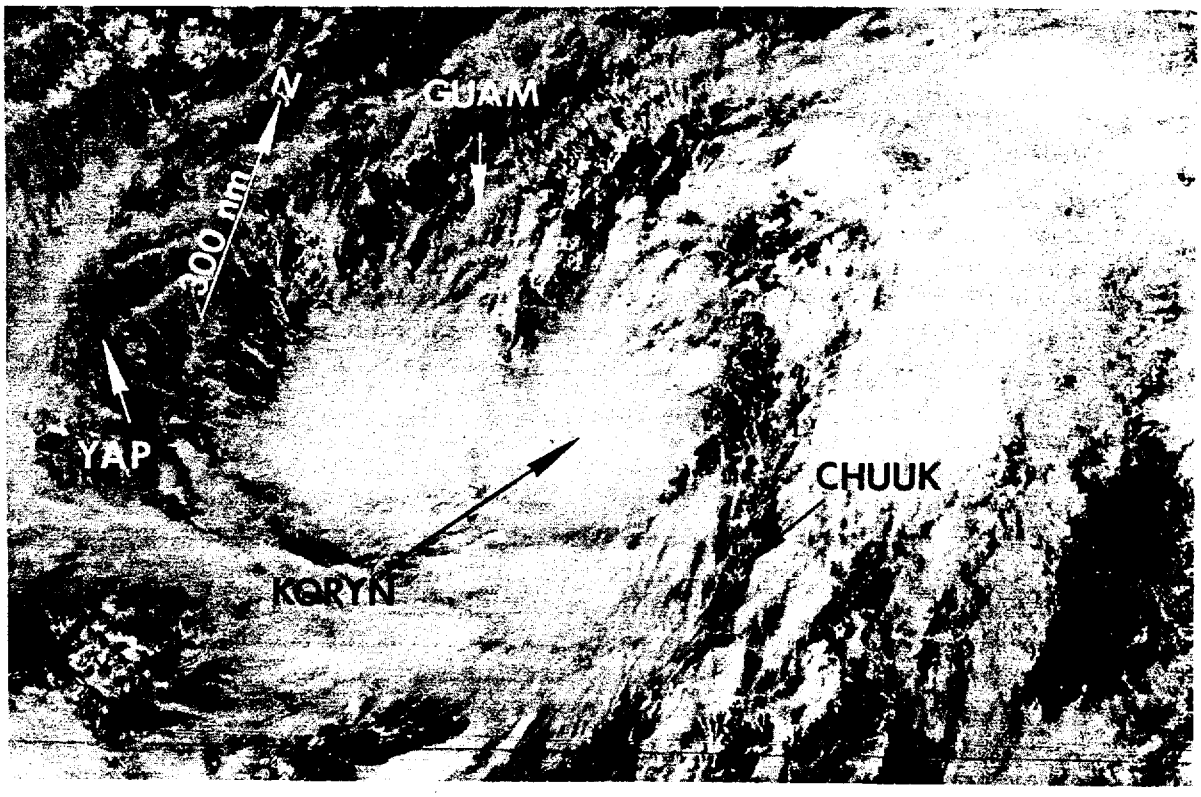
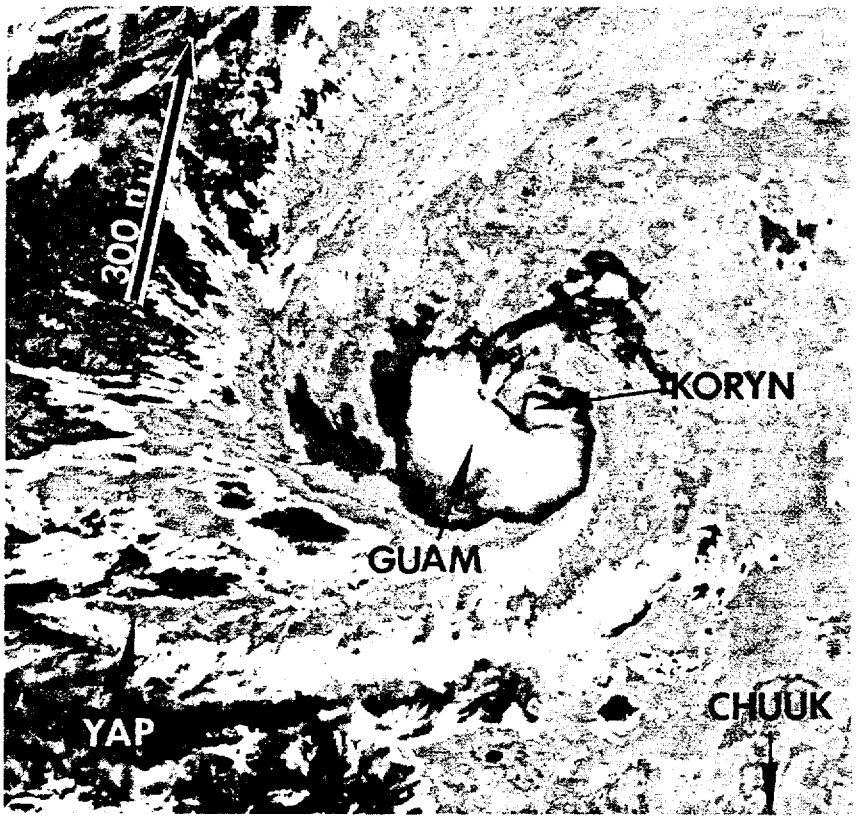


Figure 3-01-2. NOGAPS 500 mb analysis for 141200Z January shows the typhoon in the relative broad subtropical ridge. The ridge axis is at approximately 20° north latitude.



Above: Figure 3-01-3. Tropical Depression 01W's poorly defined cloudiness southeast of Guam (122330Z January DMSP visual imagery).



Left: Figure 3-01-4. Typhoon Koryn near peak intensity and just before maximum surface wind gusts to 70 kt (36 m/sec) were recorded on Guam (140958Z January NOAA enhanced infrared imagery).

latitude westerlies weakened the system. After recurvature, the cyclone's acceleration retarded the penetration of cooler low-level air into the center maintaining the intensity. Extratropical transition was completed a day after recurvature started.

V. FORECASTING PERFORMANCE

Overall JTWC forecast performance is shown in Figure 3-01-5. Initially, the weakness in the subtropical ridge was not expected to influence the track. As a result, JTWC forecast a westward track instead of recurvature near Guam. OTCM guidance (Figure 3-01-6) at first indicated a west-northwest track. However, on 13 January OTCM began to hint at recurvature. At 131800Z, JTWC included recurvature (Figure 3-01-7) as an alternate scenario, and it became the primary on the next warning. The forecast track might have been adjusted sooner, but disagreement among radar and satellite fixes resulted in the initial working best track being more westward and slower than the actual track as the system approached Guam.

VI. IMPACT

The forecasting difficulties mentioned above reduced on-island preparation time for Koryn's closest approach to Guam. Andersen AFB suspended aircraft evacuation and only one Navy ship sortied from Apra Harbor. The aircraft and ships remaining in Guam did not sustain any damage. Although Koryn passed within 50 nm (93 km) east of Guam, the island suffered only slight damage. Maximum winds reported at Andersen AFB were 40 kt (21 m/sec) gusting to 55 kt (28 m/sec). NAS Agana reported 54 kt (28 m/sec) gusting to 70 kt (36 m/sec). Koryn passed directly over Saipan, which also sustained only minor damage. Maximum winds at the Saipan Airport were 32 kt (16 m/sec), and the minimum sea-level pressure was 981 mb.

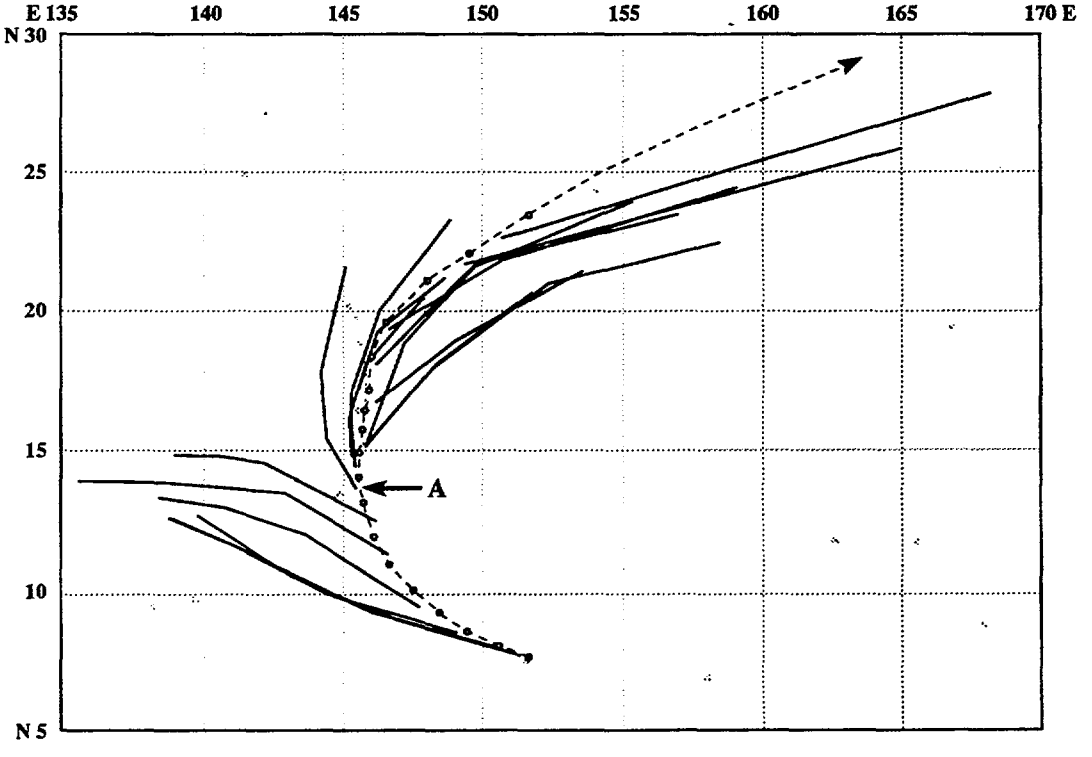


Figure 3-01-5. Summary of forecasts (solid lines) for Koryn superimposed on the final best track (dashed line). Point A identifies the first recurvature forecast at 140000Z.

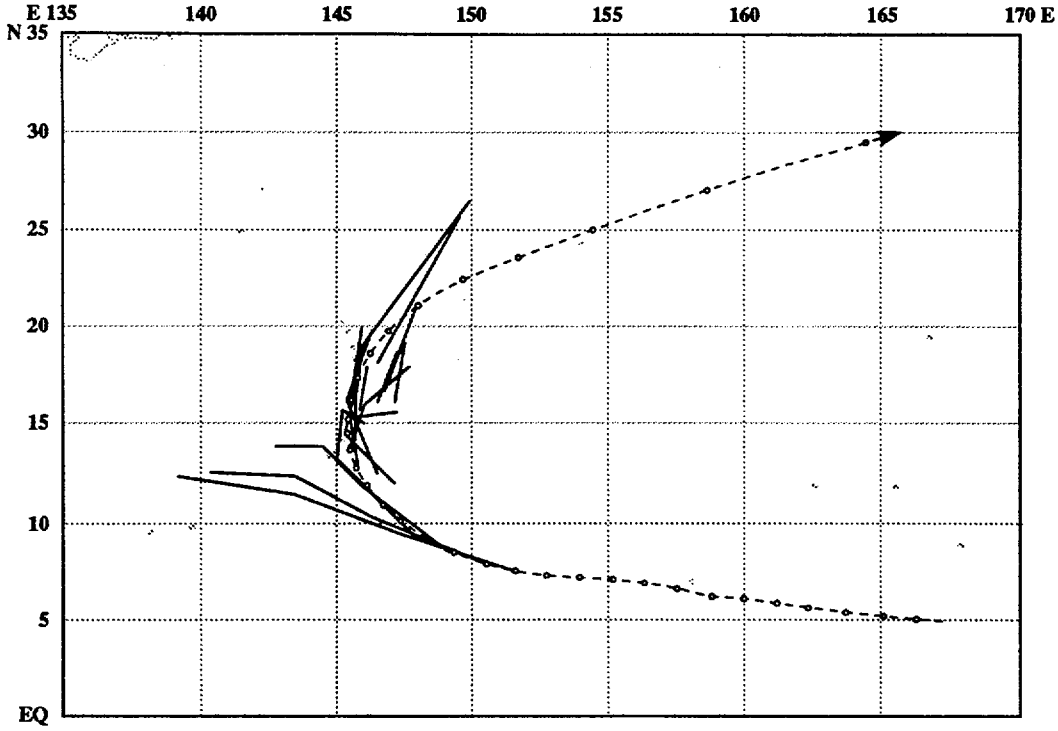


Figure 3-01-6. OTCM guidance (solid lines) superimposed on the final best track for Koryn (dashed line). OTCM started to hint at recurvature early on 13 January.

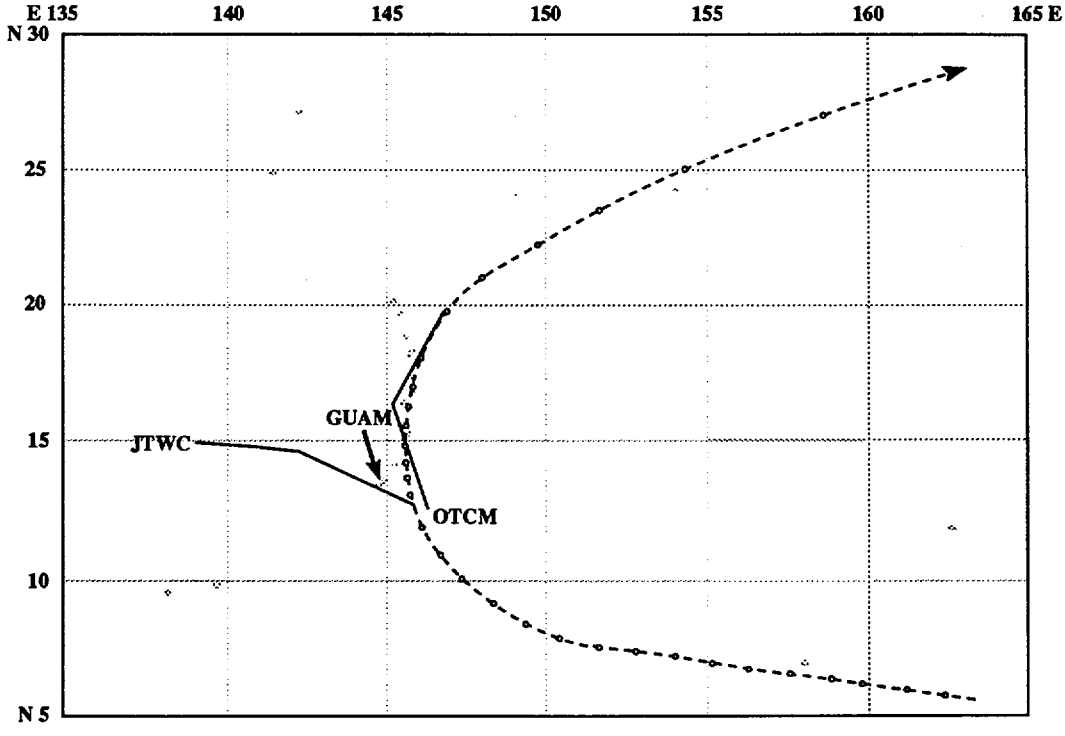


Figure 3-01-7. Comparison of the JTWC forecast (solid line) and OTCM guidance (solid line) at 131800Z.